been accustomed to think of atoms as round hard balls, but according to Bohr they are more like miniature solar systems with a positive electrical nucleus in the center and one or more negative electrical particles, called "electrons," revolving around it at tremendous speed.

Here is where Einstein comes in, for, while the planets moving majestically in their orbits obey Newton's law of gravitation, the electrons, which travel almost as fast as light, deviate from Newton's law in proportion to their speed and follow the formula of Einstein instead. According to Newton the mass of a body remains the same whatever its motion. According to Einstein, the mass increases with its velocity. The difference between them is inconsiderable for any ordinary speed, but when we are dealing with electrons moving at the rate of 100,000 miles a second it becomes important. The public has associated Einstein exclusively with astronomy because his theory has been tested at a time of eclipse, but the theory of relativity has applications quite as revolutionary and much more practical in earthly chemistry and physics.

HOW THE CHEMIST MOVES THE WORLD

THE chemist provides the motive power of the world, the world of man, not the inanimate globe. Archimedes said he could move the world if he had a long enough lever. The chemist moves the world with molecules. The chemical reactions of the consumption of food and fuel furnish the energy for our muscles and machines. If the chemist can only get control of the electron, he will be in command of unlimited energy. For in this universe of ours power seems to be in inverse ratio to size and the minutest things are mightiest.

When we handle particles smaller than the atom we can get behind th elements and may effect more marvelous transformations than ever. The smaller the building blocks the greater the variety of buildings that can be constructed. The chemistry of the past was a kind of cooking. The chemistry of the future will be more like astronomy; but it will be a new and more useful sort of astronomy, such as an astronomer might employ if he had the power to rearrange the solar system by annexing a new planet from some other system or expediting the condensation of a nebula a thousand times.

The chemist is not merely a manipulator of molecules; he is a manager of mankind. His discoveries and inventions, his economies and creations, often transform the conditions of ordinary life, alter the relations of national power, and shift the currents of thought, but these revolutions are effected so quietly that the chemist does not get the credit for what he accomplishes, and indeed does not usually realize the extent of his sociological influence.

For instance, a great change that has come over the world in recent years and has made conditions so unlike those existing in any previous period that historical precedents have no application to the present problems, is the rapid intercommunication of intelligence. Anything that anybody wants to say can be communicated to anybody who wants to hear it anywhere in all the wide world within a few minutes, or a few days, or at most a few months. In the agencies by which this is accomplished, rapid transit by ship, train or automobile, printing, photography, telegraph, and telephone, wired or wireless, chemistry plays an essential part, although it is so unpretentious a part that it rarely receives recognition. For instance, the expansion of literature and the spread of enlightenment, which put an end to the Dark Ages, is ascribed to the invention of movable type by Gutenberg, or somebody else, at the end of the four-

teenth century. But the credit belongs to the unknown chemist who invented the process of making paper. The ancient Romans stamped their bricks and lead pipes with type, but printing had to wait more than a thousand years for a supply of paper. Movable type is not the essential feature of printing, for most of the printing done nowadays is not from movable type, but from solid lines or pages. We could if necessary do away with type and press altogether, and use some photographic method of composition and reproduction, but we could not do without paper. The invention of wood-pulp paper has done more for the expansion of literature than did the invention of rag paper 600 years ago.

Print is only an imperfect representation of the sound of speech, a particularly imperfect representation in the case of English because we can not tell how half the words sound from their spelling. But the phonograph gives us sounds directly, and the audion and the radio have extended the range of a speaker, until now a speaker may have an audience covering a continent and including generations yet unborn. What these inventions do for sound, photography has done for the sister sense of light. By means of them man is able to transcend the limitations of time and space. He can make himself seen and heard all round the earth and to all future years.

THE COST OF NIAGARA

If a man stood on the banks of the Mississippi at the time of the spring freshet, when the stream was carrying down to the Gulf fences, pigs, chickens, furniture and, occasionally, a house, he would be seriously concerned over the loss of the property of those who had so little to lose, and perhaps exert himself to save some of it; but the continuous calamity of Niagara arouses in him no feelings of a nature to mar his enjoyment. He shows the same æsthetic appreciation of a sublime and beautiful spectacle and the same indifference to its cost as Nero at the burning of Rome.

It is easier to comprehend how much it is costing us to keep up Niagara as a spectacle if we put the waste in concrete terms. Various engineers have estimated that it would be possible to get from Niagara Falls over 5,000,000 more horse-power than is now utilized. In one of the large steam plants of New York City the cost of power is $50 a year per horse-power. Taking these figures as sufficiently close for our purpose the water that goes over the Falls represents the annihilation of potential wealth at the rate of some $250,000,000 a year or nearly $30,000 an hour.

We are told that there are some millions of people in poverty and poorly nourished in this country, yet here is wasted the equivalent of 250,000 loaves of bread an hour. We may see with our mind's eye 600,000 nice fresh eggs dropping over the precipice every hour and making a gigantic omelet in the whirlpool. If calico were continuously pouring from the looms in a stream 4,000 feet wide like Niagara River it would represent the same destruction of property. If a Carnegie Library were held under the spout it would be filled with good books in an hour or two. Or we can imagine a big department store floating down from Lake Erie every day and smashing its varied contents on the rocks 160 feet below. That would be an exceedingly interesting and diverting spectacle, quite as attractive to the crowd as the present, and no more expensive to maintain. Yet some people might object to that on the ground of extravagance who now object to the utilization of the power of the falling water.

It must not be supposed that I am insensible to the beauties of nature or ignore their æsthetic and cultural